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Pesticide Fact Sheet Number 103
Cadmium Pesticide Compounds

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, Science Findings

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticide Programs (TS-768C)
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EPA

Pesticide Fact Sheet

Name of Chemical: CADMIUM PESTICIDE COMPOUNDS
Reason for Issuance: SPECIAL REVIEW--PRELIM. DETERM.
Date Issued: SEPTEMBER 1986
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1. Description of chemicals

Chemical names: cadmium carbonate
cadmium chloride
cadmium sebecate
cadmium succinate
anilinocadmium dilactate

Common names: same as above

Trade names: none

EPA Shaughnessy codes (respectively): 012901, 012902, 012903, 012904, 064601

Chemical abstracts service (CAS) numbers (respectively): 134A, 135, 136A, 136B, 051D

Years of Initial Registration: 1949--1952

Pesticide type: fungicides

Chemical family: cadmium salts

2. Use patterns and formulations

Application sites: golf course and home lawn turf

Types of formulations: wettable powders, dusts, granulars

Types and methods of application: ground application by hand held sprayers and boom sprayers

3. Science Findings

Physical and Chemical Characteristics of Cadmium:

Physical state: soli(
Boiling point: 765° C
Melting point: 321° C

Human Toxicology Characteristics:

Acute toxicity: moderate to moderately high (Toxicity Categories III and II); specific values are unavailable for each compound since there are no technical registrations and there are data gaps on formulated products

acute effects to kidneys are formation of fatty bodies in the kidneys and degeneration of renal tubules

Chronic toxicity:

Oncogenic as demonstrated in laboratory animal and human epidemiological studies:

rat chronic inhalation study--LOEL of 12.5 ug Cd chloride/m^3 (lowest dose tested) for lung tumors

rat chronic injection study--3.6% Cd chloride (lowest concentration tested) caused testicular and pancreatic islet tumors

epidemiological studies of factory workers chronically exposed to cadmium oxide and dust have shown statistically significant increases in the incidences of lung tumors

Kidney effects of proteinuria, glucosuria, excretion of amino acids and decreased renal function:

rat drinking water study (24 wks)--NOEL of 10 mg/L (lowest dose tested) for proteinuria

epidemiological study of factory workers exposed to cadmium oxide and dust (50 yrs)--LOEL of 2 ug/m^3 for renal tubular proteinuria

Mutagenic effects from 36 studies on various cadmium compounds are equivocal; depending on protocol and end point examined, results vary

Teratogenic, fetotoxic and reproduction effects have been shown in laboratory animal studies however, the data do not support that cadmium would produce these types of effects in humans

4. Summary of regulatory position and rationale

The Agency initiated a Special Review of cadmium pesticide compounds in October 1977 based on data indicating that they may pose risks of oncogenicity, mutagenicity, teratogenicity and fetotoxicity from their application to golf courses and home lawns to control turf diseases.

During this time the Agency conducted further evaluations of toxicology studies of various cadmium compounds. Additionally, the Agency assessed new applicator exposure data and cadmium fungicide benefits information.

The Agency concluded that the toxicology data from laboratory animal and human epidemiological studies demonstrate a correlation between inhalation exposure to cadmium and an increased incidence of lung tumors. The Agency has classified cadmium as a "B1" or "probable" human carcinogen. Based on the derived potency value and estimates of applicator exposure, the estimates of oncogenic risk to applicators are 10^{-4} to 10^{-6} from applications to golf courses and 10^{-8} from applications to home lawns.

In regard to mutagenicity, the Agency reassessed the studies for which the Special Review was initiated and assessed additional studies that have become available since the initiation. From the results of the many studies, the Agency now concludes that there are conflicting results which cannot be readily resolved due to the many protocols and end points that have been used. Therefore, the Agency believes that the data no longer support the mutagenicity risk criteria for Special Review.

Since initiation of the Special Review, the Agency also reassessed cadmium's potential as a human teratogen and fetotoxin. Although data from some studies link cadmium with teratogenic and fetotoxic effects in laboratory animals, the Agency now concludes that the composit of data from studies do not support the risk criteria that cadmium is teratogenic and fetotoxic in humans.

Additional laboratory animal and human epidemiological studies that the Agency has reviewed since 1977 demonstrate that cadmium causes acute and chronic effects to the kidneys, including fatty body formation, renal tubular degeneration, proteinuria, glucosuria and amino acid excretion. In comparison of the lowest effect level for kidney effects with the estimated applicator exposure the Agency concludes that there are risks

of applicators developing kidney effects from the use of cadmium fungicides on golf courses and home lawns. The risk to golf course applicators is much higher than to home lawn applicators. Therefore, the Agency has added this hazard with oncogenicity for the risk criteria for this Special Review.

The Agency examined the benefits from the uses of cadmium fungicides on golf courses and home lawns and the availability of alternate fungicides and their associated hazards. The Agency concludes that the benefits are low. Use of cadmium fungicides is very low in annual volume (30,000 lbs) and in percentage of golf course acreage treated (2 %) as compared to the eleven alternatives. Use on home lawns is negligible. Some of the alternatives are as effective and some are more expensive. Total substitution for cadmium fungicides could annually cost the golf courses nationwide as much as $240,000 or $500 each. Some of the alternatives are associated with chronic hazards while others are not.

The Agency received seven comments from the cadmium registrants during the comment period. These were arguments against the risk criteria for the initiated Special Review and additional benefits information. All comments and the benefits information have been considered and are addressed in the Technical Support Document.

The Agency has carefully evaluated all the information and also considered possible measures to reduce exposure and the risks of oncogenicity and kidney effects. The weight of the evidence leads the Agency to conlude that the risks to applicators outweigh the minor benefits and therefore cancellation is the prudent regulatory action to propose.

This proposed regulatory action along with a request for comments from the public, USDA and the FIFRA Science Advisory Panel will be published in the Federal Register in October 1986. The comment period will be 60 days. After that time the Agency will evaluate any received comments in consideration of their impact on the risk and benefit assessments and the proposed regulatory decision. The Agency will then complete the Special Review by publishing in the Federal Register a final decision.

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